2.2 - 2.4: Methods covered thus far

Wednesday, January 22, 2020 2:55 PM

separable
linear first order
exact

example: identify the method(s)

a) $\frac{dy}{dx} - x^2 + 3x^2 y = 0$

$\frac{dy}{dx} = x^2 - 3x^2 y$

$\frac{dy}{dx} = x^2(1-3y)$

$\frac{dy}{1-3y} = x^2 dx$

separable

$\frac{dy}{dx} + 3x^2 y = x^2$

$IF = e^{\int P(x)dx}$

$= e^{\int 3x^2 dx}$

linear first order

$\frac{dy}{dx} + (3x^2 y - x^2) = 0$

$dy + (3x^2 y - x^2)dx = 0$

$(3x^2 y - x^2)dx + dy = 0$

$\frac{\partial M}{\partial y} = 3x^2 \qquad \frac{\partial N}{\partial x} = 0$

not exact
(could find IF)

b) $(2xy^2 - 3)\,dx + (2x^2 y + 4)\,dy = 0$

not separable

$\frac{dx}{\text{expression}} = \frac{dy}{\text{different}}$

not linear

x^2 and y^2

is it exact?

$\frac{\partial M}{\partial y} = 4xy \qquad \frac{\partial N}{\partial x} = 4xy$

$$\frac{dx}{\text{expression in } x \text{ and } y} = \frac{dy}{\text{different expression in } x \text{ and } y}$$

x^2 and y^2

$$\frac{\partial M}{\partial y} = 4xy \qquad \frac{\partial N}{\partial x} = 4xy$$

yes, exact